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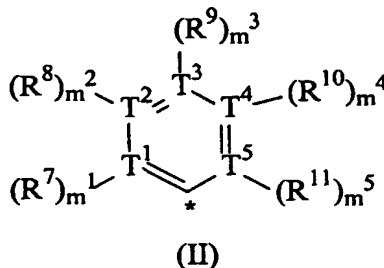
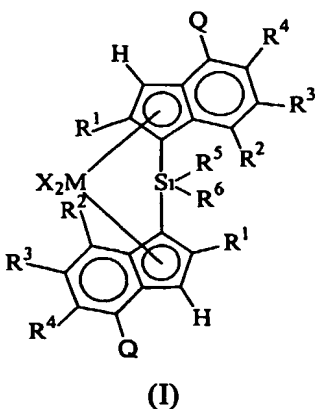
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- Published:**
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- (88) Date of publication of the international search report: 12 August 2004
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: PROCESS FOR THE COPOLYMERIZATION OF ETHYLENE



(57) Abstract: A process for producing a copolymer of ethylene containing from 0.1 to 99 % by mol of one or more derived units of alpha-olefins of formula $\text{CH}_2=\text{CHA}$, wherein A is a $\text{C}_2\text{-C}_{20}$ alkyl radical, comprising contacting, under polymerization conditions, ethylene and one or more alpha-olefins in the presence of a catalyst system obtainable by contacting: a) a metallocene compound of formula (I): wherein M is zirconium, titanium or hafnium; X, same or different, is a hydrogen atom, a halogen atom, or an hydrocarbon group; R^1 , is a hydrocarbon group; R^2 , R^3 , R^4 , R^5 and R^6 , are hydrogen atoms or hydrocarbon groups; Q is a radical of formula (II), being bonded to the indenyl

at the position marked by the symbol *; (II) wherein: T^1 , T^2 , T^3 , T^4 and T^5 , are carbon atoms (C) or nitrogen atoms (N); m^1 , m^2 , m^3 , m^4 and m^5 are 0 or 1; R^7 , R^8 , R^9 , R^{10} and R^{11} are hydrogen atoms or hydrocarbon groups; and b) an alumoxane or a compound capable of forming an alkyl metallocene cation.

INTERNATIONAL SEARCH REPORT

Rec'd 29 MAR 2004

International Application No.

PCT/EP/02/40067

A. CLASSIFICATION OF SUBJECT MATTER
EPC 7 C08F210/16 C08F4/642

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C08F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01/48034 A (FISCHER DAVID ;WEISS HORST (DE); BINGEL CARSTEN (DE); FRAAIJE VOLK) 5 July 2001 (2001-07-05) example 9 page 87 - page 88; examples 90-97 claims 2,15-23	1-7,13, 14
X	WO 98/40416 A (GOERES MARKUS ;TARGOR GMBH (DE); BINGEL CARSTEN (DE); FRAAIJE VOLK) 17 September 1998 (1998-09-17) page 19 - page 23; examples 3-5; table 1 claims 2,10	1-14
X	WO 01/46274 A (BASELL POLYOLEFINE GMBH ;RAUSCHENBERGER VOLKER (DE); LILGE DIETER) 28 June 2001 (2001-06-28) claims 1,5	1-14
	- / - -	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

*** Special categories of cited documents :**

"A" document defining the general state of the art which is not considered to be of particular relevance

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

15 January 2004

Date of mailing of the international search report

19. 05. 2004

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 03/10107

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/02575 A (EXXONMOBIL CHEM PATENTS INC) 10 January 2002 (2002-01-10) tables 3-5 claim 23	1-14
A	----- WO 00/44799 A (BREKNER MICHAEL JOACHIM ;TARGOR GMBH (DE); FRAAIJE VOLKER (DE); KR) 3 August 2000 (2000-08-03) page 38 - page 40; examples 3-6 -----	1-14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP 03/10107

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1 - 14 (in part)

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R7 where applicable is C1 and R8-R11 are hydrogen.

2. claims: 1-14 (n part)

The subject matter of claims 1-14 (in part) where R7 where applicable is C2 and R8-R11 are hydrogen.

3. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R7 where applicable is C3 and R8-R11 are hydrogen.

4. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R7 where applicable is C4 and R8-R11 are hydrogen.

5. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R7 where applicable is C5 and R8-R11 are hydrogen.

6. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R7 where applicable is C6 or higher and R8-R11 are hydrogen.

7. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R8 where applicable is C1 and R7,R9-R11 are hydrogen.

8. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R8 where applicable is C2 and R7,R9-R11 are hydrogen.

9. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R8 where applicable is C3 and R7,R9-R11 are hydrogen.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

10. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R8 where applicable is C4 and R7,R9-R11 are hydrogen.

11. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R8 where applicable is C5 and R7,R9-R11 are hydrogen.

12. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R8 where applicable is C6 or higher and R7,R9-R11 are hydrogen.

13. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R9 where applicable is C1 and R7-R8,R10-R11 are hydrogen.

14. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R9 where applicable is C2 and R7-R8,R10-R11 are hydrogen.

15. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R9 where applicable is C3 and R7-R8,R10-R11 are hydrogen.

16. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R9 where applicable is C4 and R7-R8,R10-R11 are hydrogen.

17. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R9 where applicable is C5 and R7-R8,R10-R11 are hydrogen.

18. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R9 where applicable is C6 or higher and R7-R8,R10-R11 are hydrogen.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

19. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R10 where applicable is C1 and R7-R9, and R11 are hydrogen.

20. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R10 where applicable is C2 and R7-R9, and R11 are hydrogen.

21. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R10 where applicable is C3 and R7-R9, and R11 are hydrogen.

22. claims: 1-14 (in part)

the subject matter of claims 1-14 (in part) where R10 where applicable is C4 and R7-R9, and R11 are hydrogen.

23. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R10 where applicable is C5 and R7-R9, and R11 are hydrogen.

24. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R10 where applicable is C6 or higher and R7-R9, and R11 are hydrogen.

25. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R11 where applicable is C1 and R7-R10 are hydrogen.

26. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R11 where applicable is C2 and R7-R10 are hydrogen.

27. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R11 where applicable is C3 and R7-R10 are hydrogen.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

28. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R11 where applicable is C4 and R7-R10 are hydrogen.

29. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R11 where applicable is C5 and R7-R10 are hydrogen.

30. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where R11 where applicable is C6 or higher and R7-R10 are hydrogen.

31. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where any two of R7-R11 are not hydrogen and are not linked to each other.

32. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where any two of R7-R11 are not hydrogen and form a ring.

33. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where any three of R7-R11 are not hydrogen and are not linked to each other.

34. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where any three of R7-R11 are not hydrogen and any two or more of them form a ring.

35. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where any four of R7-R11 are not hydrogen and are not linked to each other.

36. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where any four of R7-R11 are not hydrogen and any two or more of them form a ring.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

37. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where all five of R7-R11 are not hydrogen and are not linked to each other.

38. claims: 1-14 (in part)

The subject matter of claims 1-14 (in part) where all five of R7-R11 are not hydrogen and any two or more of them form a ring.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern Application No

PCT/EP 03/10107

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INTERNATIONAL SEARCH REPORT

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International Application No

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